LUBRICATION

Published by THE TEXAS COMPANY

17 Battery Place, New York City

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VOL. V OCTOBER, 1918 No. 12

Published Monthly in the interest of efficient lubrication.

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"LUBRICATION" DISCONTINUED TEMPORARILY AS A WAR MEASURE

The fact that this country is at war has been brought home very forcibly to The Texas Company. Long before the selective draft reached any of our employes, some of our best men, particularly in the Lubricating Department, were taken over by Uncle Sam for more important tasks. At the present time practically our whole engineering staff, to say nothing of thousands of our other employes, is in government service.

Since the beginning of the war the keynote of the policy of The Texas Company and of "Lubrication" has been conservation, and in "Lubrication" we have advocated particularly the conservation of lubricants. The time has now come when this policy of conservation reaches home, and we have at last consented to discontinue "Lubrication" temporarily. The purpose of this step is to conserve man power and print paper, and also to aid in relieving the congestion of the mails.

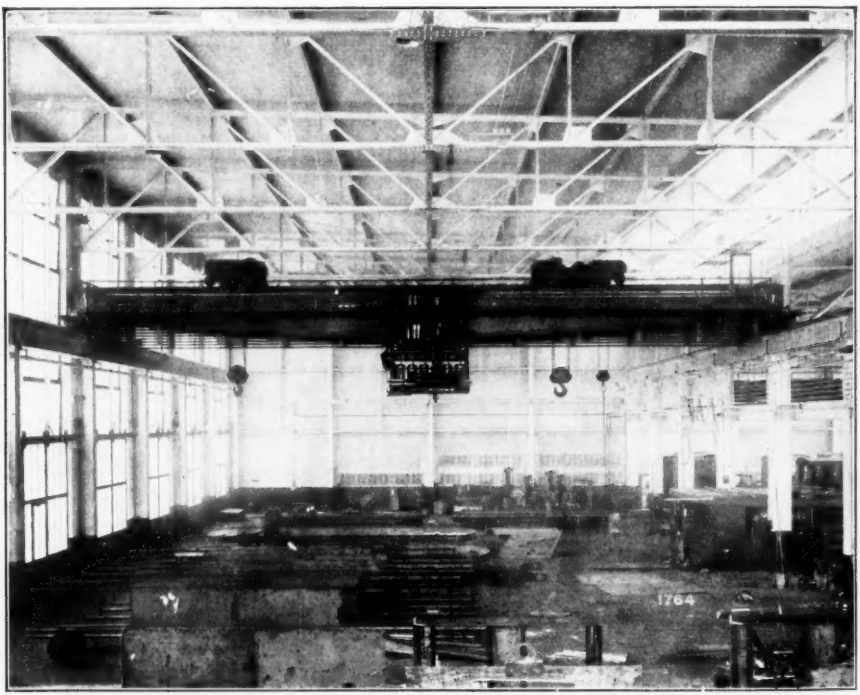
Recent issues of "Lubrication" have consisted of 25,000 copies. These copies have been distributed not only in every state in the Union, but in practically every foreign country as well. In South America the magazine is being translated into Portuguese for distribution particularly in Brazil. It is no small sacrifice, therefore, that we are making and asking our friends to make when we suspend, even for a time, this publication. We believe, however, that you will cheerfully join us in meeting all the sacrifices imposed by the war.

We hope that, when this tremendous conflict is over and the world has once more settled down to normal conditions, "Lubrication" will not only again take its wonted position among engineers and oil consumers, but that it may continue to play an ever increasing part in the spreading of practical information on the subject of lubricants and their application.

ELECTRIC CRANE LUBRICATION

By Geo. R. Rowland

As in the case of any other machine, the good service and the length of life of an electric crane depends largely upon the care and general efficiency with which it is lubricated. Electric cranes are of many types and designs, and practically every type has some method of applying the lubricants peculiar to itself.



Whiting Crane at the Erie Plant of the General Electric Company lubricated with Texaco Crater Compound

There are many types of bearings used on the crane motors, but the modern types are usually ring oiling bearings (Figure 1).* The ring oiling system consists of an oil reservoir and a brass ring which is attached to and revolves with the shaft and which has the effect of raising the oil from the reservoir and distributing it along the shaft. In this form of bearing, where ordinary operating conditions are met, a medium viscosity, filtered oil, such as Texaco Cetus Oil, should be used. An oil of this description, which has a zero cold test, can be used in very low temperatures as for example on electric cranes which may be located in shops or mills exposed to low temperatures or

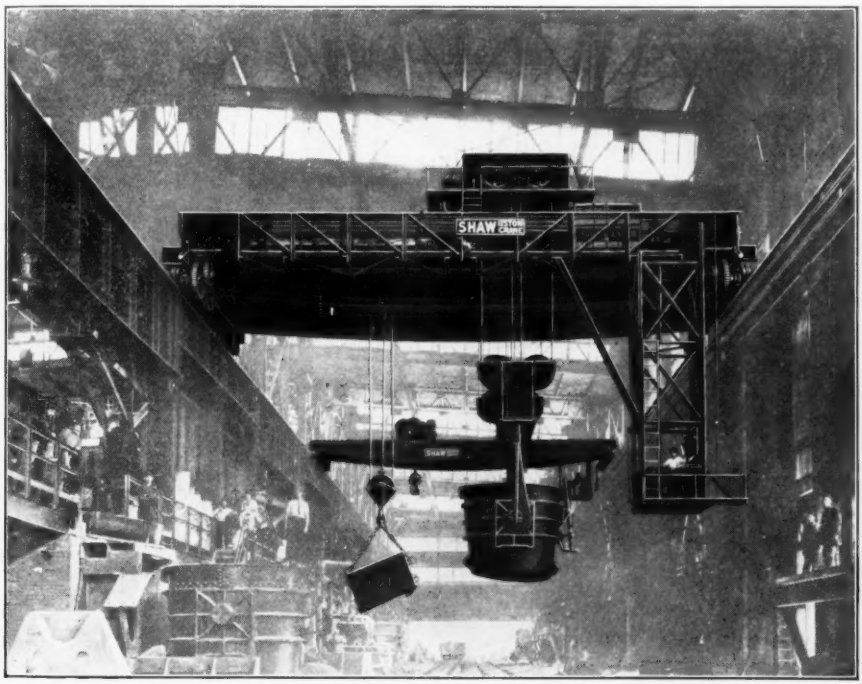
*Editor's Note—We are indebted to Mr. A. V. Light, Chief Engineer of Manning, Maxwell & Moore, Inc., Shaw Crane Works, for cuts shown in this article and for part of the material.

which are used in yards and for general outdoor work.

For the same type of bearing on electric cranes which are used in operation where high radiated heat is encountered, as in many parts of steel mills, it has been found more practical to use Texaco Algol Oil which is of a much higher viscosity and naturally offers a much heavier film under high temperatures than

required from a lubricating standpoint is that of seeing that the oil reservoir has a sufficient amount of oil for the ring to dip in.

The bearing shown in figure two, is used to a considerable extent on electric crane motors and is designed with a large pocket in which grease is placed. In this type of bearing it is necessary that care should be used in the selection of the grade of



Shaw Crane and Ladle

a lower viscosity oil. It sometimes occurs that the steel mills may be shut down over a sufficient period of time to permit the temperature to become very low throughout the whole mill, and Algol Oil, while of much heavier viscosity than the Cetus Oil, will not cause any difficulty should the crane be put in operation under low temperature conditions. With this type of bearing, practically the only attention

grease, and under ordinary operating conditions Texaco No. 3 Grease will give very efficient results. However, if the crane is exposed to low temperatures, it is found more practical to use Texaco No. 1 Grease.

In some instances, these bearings are equipped with sight feed drip cups, in which case great economy and efficiency can be obtained with the use of Algol Oil. The heavy

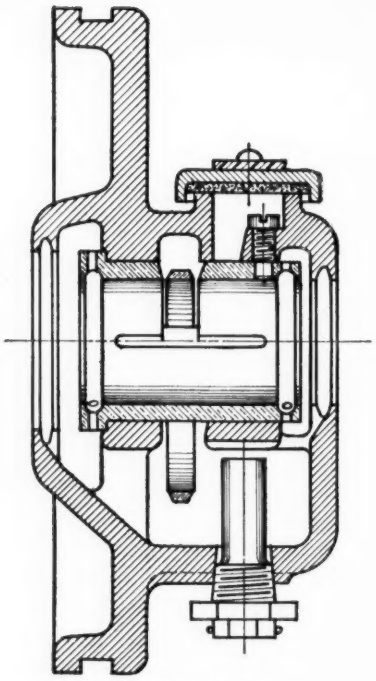


Figure 1

viscosity of this oil makes it possible for the operator to regulate the feed so that efficient lubrication will be economically afforded, and the heavy film eliminates waste which would be shown in the use of a lighter viscosity oil under ordinary working conditions.

In some instances the method used in lubricating this type of bearing is by the saturation of wool waste with oil. Where this method is in vogue, it is well to use the highest grade long fibred waste wool to be procured and to avoid a possibility of the waste rolling or dragging under the bearing. It is essential that the oil to be used for this purpose have a low cold test such as is found in Texaco Algol Oil.

In modern practice, we find some motors equipped with ball and roller bearings of different designs. The lubrication of this type of bearing should receive special attention as in many cases it is necessary to select a lubricant particularly adapted to this class of work.

For the shaft bearings grease is quite commonly used, and is fed by compression cups of various types as shown in Figures 3, 4 and 5. In ordinary operation, Texaco No. 3 Grease will afford efficient lubrication. However, for low temperatures, the No. 1 Grease is better adapted to the purpose. In some instances, ring oilers, as shown in Figure 6, are used, and on account of the comparatively slow operation of the shaft, an oil of a heavy viscosity, such as Texaco Algol Oil, should be used.

For the running sheaves, grease is quite universally used, and a grease such as Texaco No. 3 Grease will be found to give efficient lubrication.

The crane wheel in most common use is shown in Figure 7. These

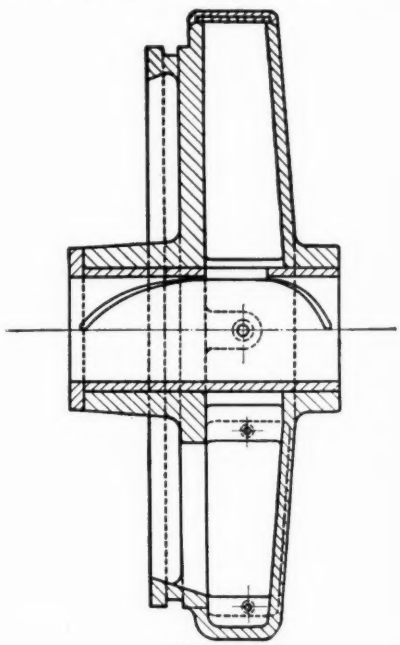


Figure 2

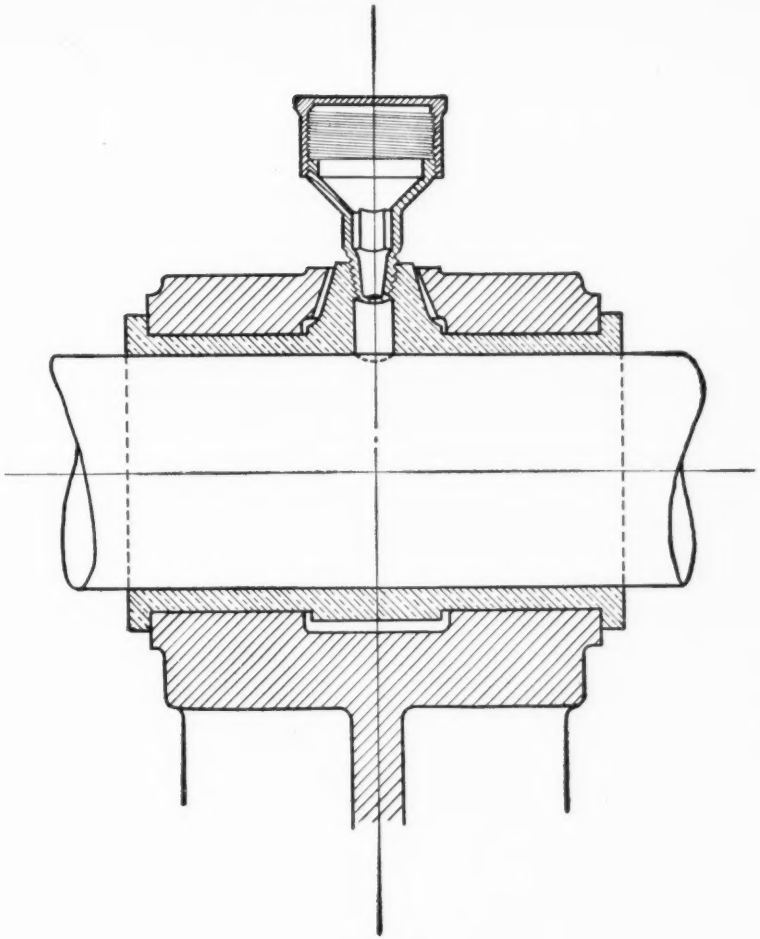


Figure 3

wheels run free on the pin, and are usually lubricated by compression grease cups, which are located in the end of the pin and which transmit the grease to the bushing. Texaco No. 3 Grease will afford efficient lubrication for this class of work under most operating conditions.

Another type of bearing, known as the MCB (Figure 8), has the wheel keyed to the axle. The axle revolves in bored seat brasses, equipped with oil cellars, in which the common practice is to use oil soaked waste. In this type of bearing the material used should be long fibred, high grade wool waste, and to avoid rolling caused by clinging to the shaft in low temperatures, an oil with a zero cold test, such as Texaco Algol Oil, should be used. This oil with its high viscosity will also afford lubrication in instances where high temperatures are to be contended with.

The brake devices are many, but the ones demanding the most attention are those that are constructed in the form of washers, and known

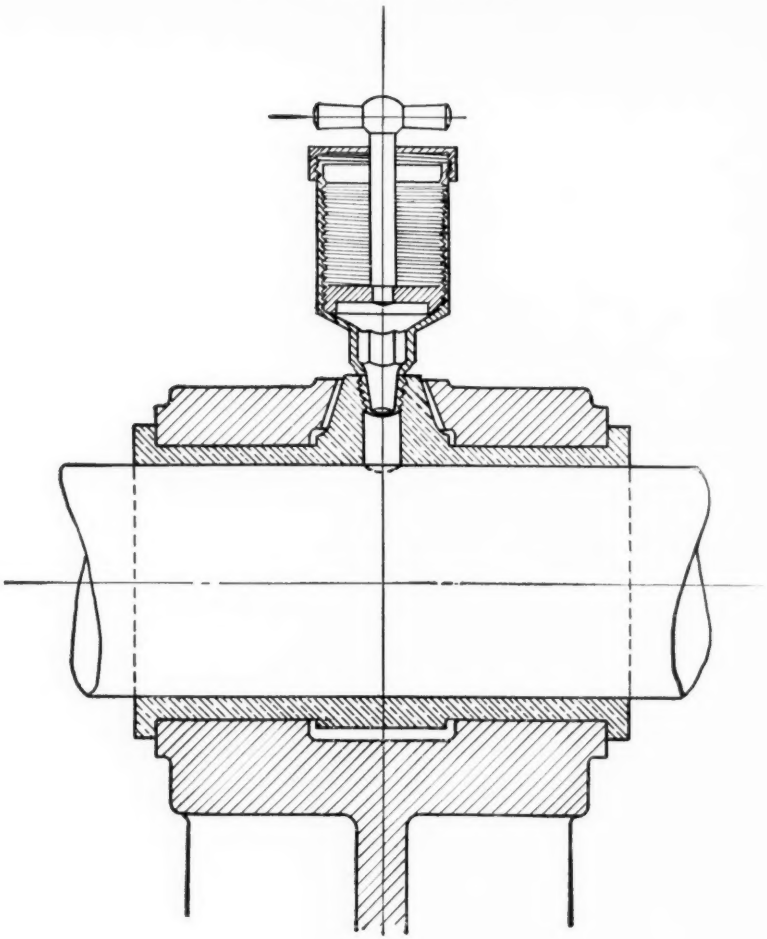


Figure 4

as washer load brakes. This type has an arrangement in a case that holds the lubricant for the bands and washers. Brakes of this type, as a rule, should be lubricated with a medium viscosity oil, such as Texaco Cetus Oil. In instances where electric cranes are operated under high temperatures, Texaco Algol Oil should be used. Considerable trouble will be experienced if this particular part of the crane is not given proper attention, as the oil must retain a state of fluidity at all times, so that it will find its way between the washers. In some types of cranes, where magnetic brakes are used, lubrication is unnecessary. In fact, it is as important that brakes of this type be free from lubricants, as that those that require a lubricant should be properly lubricated.

As gears play a very important part in the mechanism of an electric crane, they can readily be considered as one of the most important parts to be lubricated. In most designs, the gears are encased in metal cases, it being the idea of

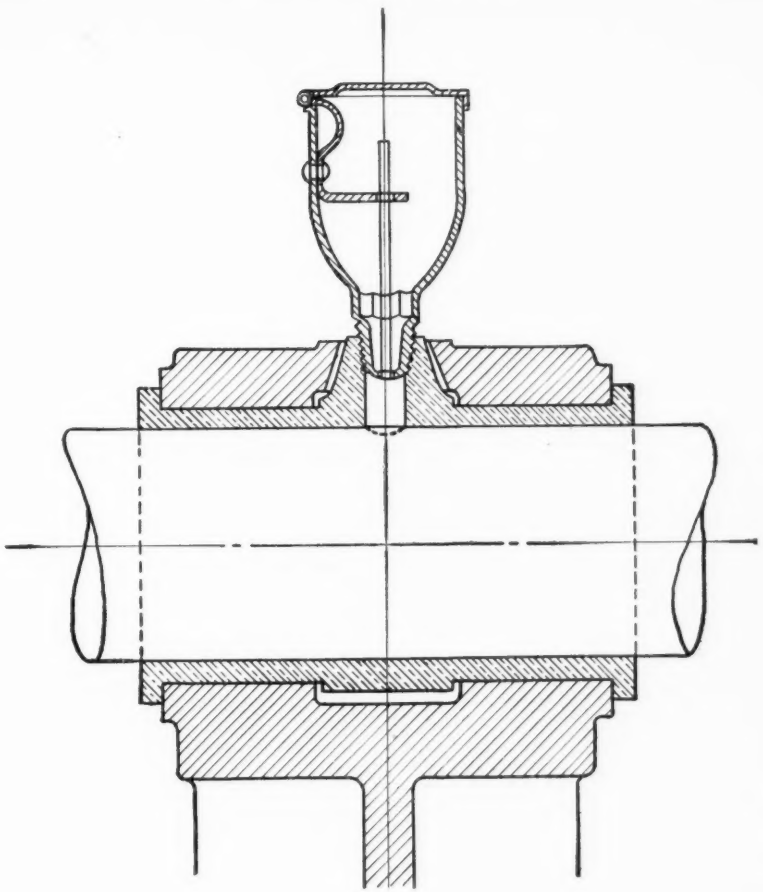


Figure 5

the manufacturer that a non-fluid oil or a semi-fluid oil should be used. A large volume of these lubricants will deaden the noise to a certain extent, but their effect in preventing wear is almost negligible. The most efficient lubricant is one that will not squeeze out when the gear teeth are in mesh, but that is adhesive and of heavy viscosity. Texaco Crater Compound No. 1 is suitable for this class of work under either normal or high temperatures, but where the crane is operating in low temperatures, Thuban Compound will be found to give the most efficient results. Where the gears are operated with the bath method, it is only necessary that enough Crater Compound be placed in the case to cover the bottom point of the lowest tooth, as, being of a very adhesive nature, it will carry around to the other gears. Where the gears are not encased, Crater Compound No. 1 can be used in normal and low temperatures, but in high temperatures, it is sometimes found advantageous to use Crater Compound No. 2, which, being of heavier viscosity, will eliminate the dripping effect and naturally offer more

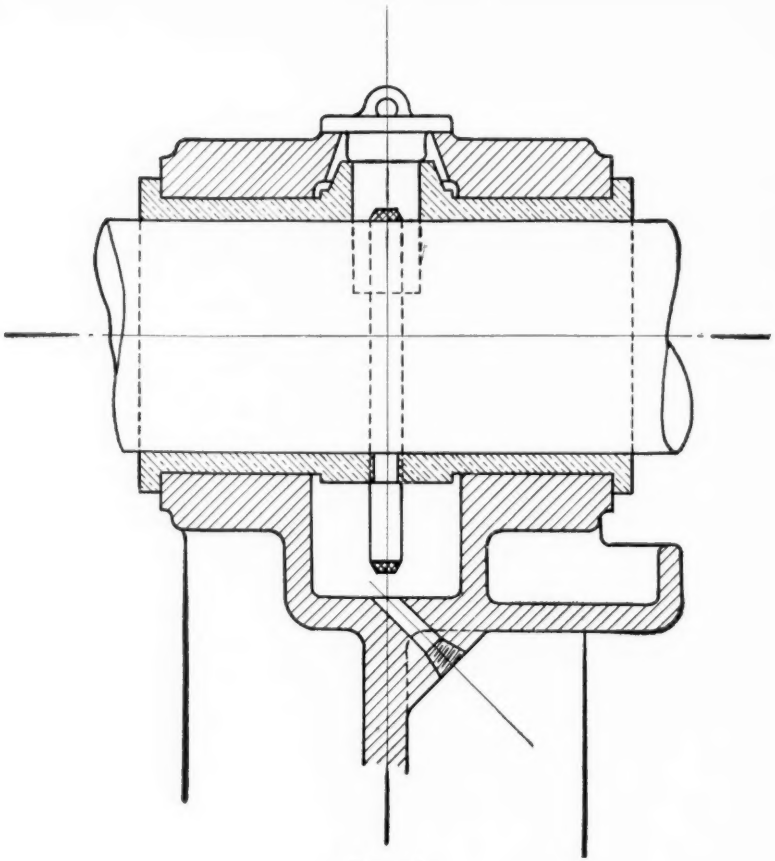


Figure 6

efficient lubrication. On the exposed gears, care should be taken in the application, which can be either with a small brush or by pouring on in a very fine stream at the point of mesh while the gears are operating slowly. This method should also be used for open spur and bevel gears which move the trolleys back and forth, and which control the movement of the span on the rails. The lubrication of electric crane gears is of vast importance, and under no circumstances should ordinary oil or greases be used, as the operation of these gears, like that of other gears, is such as to require a special lubricant like Texaco Crater Compound to meet the high pressures and exacting conditions under which gears are operated.

Sometimes gear lubricants are used which harden on the gear teeth, and fill up the space between the teeth, forcing them open and imposing an excessive load upon the motor and bearings. As the gears are not easily accessible, they are not given proper attention by the operator and lubrication is taken care of only when something breaks or wears out and shows that the lubricant must be applied.

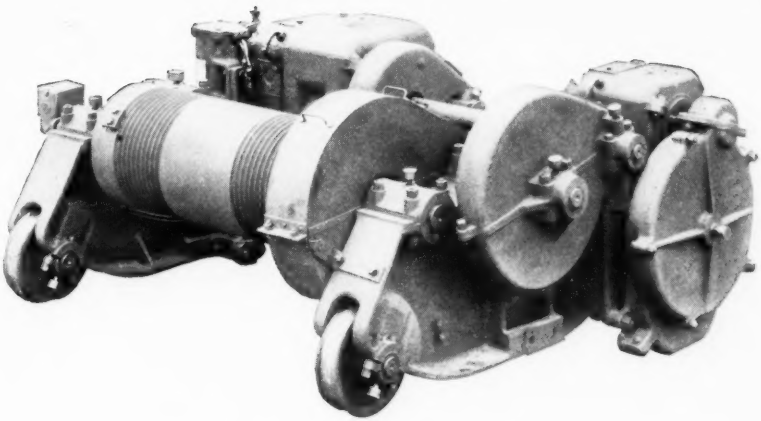


Figure 7—Free Running Wheel

Those interested in the production of the plant of which the crane is a large factor cannot be too careful in the selection of a proper gear lubricant and insisting that it be applied properly and regularly.

It is a matter of common knowledge that the proper care and lubrication of wire ropes will bring profits far in excess of the time and expense involved, and in these days when the cost of wire rope has reached a high mark, any suggestion that enables the wire rope user to receive greater returns for his investment should be welcome. An analysis and careful investigation of materials most commonly used for this class of work shows that pitch, tar, graphite and other fillers are used in large proportions for the purpose of developing a heavy, adhesive mixture. Such material has the effect of only partially protecting the external part of the rope, and at low temperatures will crack and peel, permitting water, sometimes charged with acids, acid fumes or other injurious elements to attack the internal part of the rope, and instances are not infrequent of the rope breaking where the visible parts of the rope show no signs of deterioration. In some instances, ordinary Black Oil is used. Outside of a temporary effect, oils of this kind are worthless as rope lubricants, and where such grades are used, frequent applications are necessary, as they are thrown off or evaporate within a few hours after they are applied, leaving the rope at the mercy of the elements and frictional wear. A rope that is occasionally lubricated with Crater Compound shows a fine dark oily coating over all of the wires, which serves to protect the rope from corroding influences, reduces wear due to friction of the sheaves, and what is most important, checks the internal wear by perfect penetration.

The object of inserting the hemp center in a wire rope is to increase the flexibility of the rope, and the deterioration of this center has the same effect as the deterioration of the material surrounding it. If Crater Compound is applied, it will penetrate to the center and furnish continual lubrication. Further, hemp centers which are not lubricated with the proper lubricant,

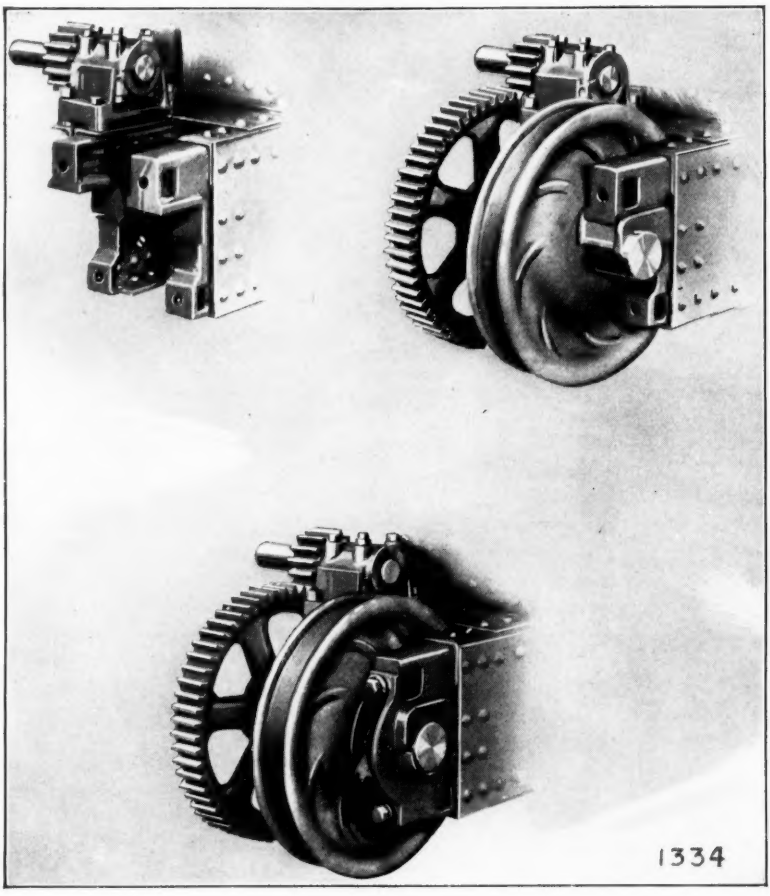


Figure 8—Wheel Keyed to Axle

absorb moisture with the result that they soon decay.

An important feature in wire rope lubrication is the method of application. As Crater Compound has a very high viscosity, and is of an adhesive nature, it is necessary that it be thoroughly heated, and a thin film applied with a small brush and at such intervals as operating conditions demand, or as frequently as necessary to keep the rope from being exposed to a direct contact with other metals which they are operating over. If this procedure is followed, the electric crane user is assured that the internal part of the rope will be properly taken care of with Texaco Crater Compound.

In a number of plants where several cranes are in operation, regular attention is given not only to the general maintenance and lubrication of the operating parts, but also to the lubrication of the cranes. This procedure has been found to be a very profitable innovation in plant maintenance.

TEXACO PRODUCTS IN FOREIGN FIELDS

JAPAN (South Dist. E)
April 20th, 1918

MITSUI MIIKE TANKO (Coal Mine)
MIIKE, near OMUTA STATION (Kyushu)

The writer visited the above coal mine for the first time in reference to the lubrication of the machinery at the electrical power station.

This machinery consists of two units of Nurnberg Gas Engines. A third is now being erected, and at least three more units are being built. All these last units are being built in Japan at Miike Engine & Iron Works, Kyushu, and are all the same size and type as the original two units.

The present and contemplated electric generating power units have a capacity of 2000 k. w. The gas engines are horizontal and are direct connected to the generators, having four cylinders of 1000 millimeter diameter, which are working on the four stroke cycle and are running at 100 r.p.m. Bearing and crank shaft lubrication is by force feed system, and cylinder lubrication is taken care of with Mollerup Lubricators, delivering the oil at the middle of the stroke on three points of the circumference of the cylinder top, and on each side. The engines are working night and day at full load.

I obtained a trial order for ten barrels of Texaco Honor Oil and five barrels of Texaco Algol Oil, the Texaco Honor Oil to be used for the bearing and crank-shaft lubricating system, and the Texaco Algol Oil to be used for the cylinder lubrication.

The above oil was delivered some time during February, and on or about March 1st, a letter from the superintendent, Mr. J. Ogata arrived, in which he stated that the physical properties of our Texaco Algol Oil were found, after being tested in their laboratory, to be quite different from the cylinder lubricating oil which had been used before, and that he therefore was indisposed to use it. I then wrote a letter, explaining why the difference in physical properties would have no bearing on the suitability of the oil, and at the same time asking him to test Texaco Algol Oil for, say, 14 days on the one side of his gas engine, comparing results with the oil formerly used, following the general outline of such a test as had been agreed to when I visited him during January. I suggested that I would call on him again when such a test had been made in order to examine the conditions of the machinery and compare the actual results. This was agreed to.

On March 25th, I called again at the power station and met the superintendent and the chief engineer, Mr. Z. Kitagawa. I was informed that everything seemed to be all right, the oil had been used for 15 days, and the cylinders had been thoroughly cleaned out before the test was started. The maximum lift of the gas inlet-valve on the side lubricated with Texaco Algol Oil was only 41.5 millimeters, while the maximum lift of the inlet valve on the side to which the competitive oil was applied was 45 millimeters. These measurements were

Coal Mine at Miike

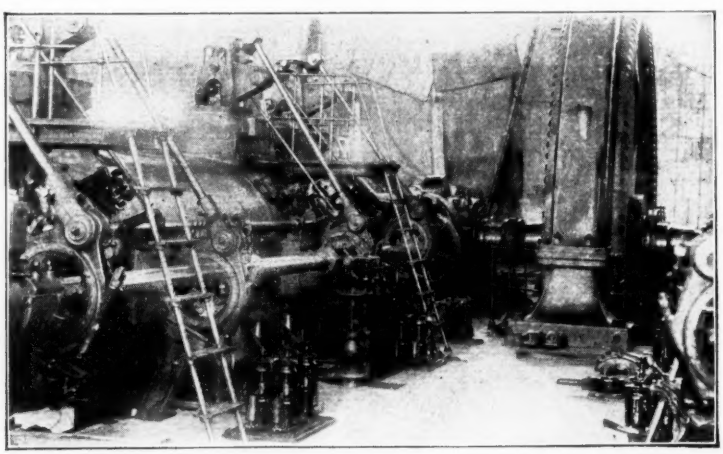
both taken with a load of 1700 k. w. It therefore appeared that Texaco Algol Oil assisted the reduction of frictional losses to such an extent that the gas inlet valve lift could be reduced 4.5 millimeters, which of course spoke well for our oil as a lubricant.

It was then decided to stop the engine on the following morning, on which the test was being conducted, open the cylinders and examine the conditions. On March 26th, I called again, and we examined the cylinders. It was then found that the two cylinders on which the competitive oil had been used were dry, and considerable carbon scale had collected inside the cylinders and on the free-way of the piston rod; whereas, the two cylinders lubricated with Texaco Algol Oil showed an oil-film and no carbon scale whatever on the free-way of the piston-rod; only a discoloration could be noted, but it could not be called scale, having no thickness. This result caused considerable astonishment to both the superintendent and the chief engineer. The same quantity, six gal. per 24 hours, had been applied to each tandem set of cylinders, and by looking at the cylinder conditions it appeared that more of the competitive oil should be applied to obtain efficient lubrication, which of course would cause still more carbon deposit, whereas the quantity of Texaco Algol Oil which had been used could be reduced, maybe as much as one gal. per 24 hours. Previously it had been necessary to stop the engines every forty or fifty days to clean the cylinders of carbon, while with Texaco Algol Oil in use, it appeared that a run from 150 to 170 days could be made without stopping on this account, which at this particular power station was an important item on account of the shortage of power caused by such stoppage. I obtained an additional order for five barrels of Texaco Algol Oil with which to conduct a more prolonged test, and I feel sure that I will get the whole business as the result of the initial test was so evidently favorable for Texaco Algol Oil.

During the test of Texaco Algol Oil for cylinder lubrication our Texaco Honor Oil has been used in the lubricating system which takes care of bearing and crank pin lubrication of the engines. The result was a reduction of the bearing temperatures from 121° F. with the oil formerly in use, to 114° F. with Texaco Honor Oil. This reduction of 7° F. in bearing temperatures as a result of using Texaco Honor Oil was not bad, of course, but as I have been used to still better results, I inquired how large the charge in each system was.

It was then found that each system would hold 500 gallons and that the system working on the competitive oil was charged with 500 gal. but that the system which was working with Texaco Honor Oil had only been charged with 250 gallons, the minimum charge which could be used, the engineer not wanting to put a larger charge in before he knew that the oil was satisfactory. I was then content, because if a 250 gal. charge can work against a 500 gal. charge and still show a reduction of bearing temperature equal to 7° F., it is clear that if the two charges be made equal, say 500 gal. each, a much larger reduction in bearing temperatures would be the result, and my expectation of a reduction of bearing temperatures of from 15° F. to 20° F. will therefore most likely be the ultimate result.

N. C. Bruun.



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Lubrication

DECEMBER, 1916

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Published by
THE TEXAS COMPANY
New York